

Aggression prone individuals respond differently to emphatically vocalized “no”

Alia-Klein N, Goldstein RZ, Tomasi D, Zhang L, Cottone L, Fowler J, Volkow ND, Wang GJ

The word “no” shapes behavior during development as it is associated with inhibitive commands from the conditioning environment. However, individuals vary with regard to inhibitory control and we hypothesized that those who are aggression-prone may have a different response to “no” as compared with non-aggression-prone individuals. Seventeen healthy male subjects were screened and pre-selected as aggression-prone (APs) and non-aggression-prone (NPs) mainly based on their self-reported responses at either extreme on the Buss-Perry Aggression Inventory (subjects with scores in the middle were not recruited). As expected, results showed that the groups differed on other scales such as the multidimensional personality questionnaire aggression subscale (MPQag, $t=4.9$, $p<.0001$), and extra-scan performance on the attention network task, conflict subset (ANTconflict, $t=4.4$, $p<.0001$). During fMRI at 4-tesla, subjects were exposed to visual and emphatic auditory presentations of the word “no” and other words matched on frequency of use in English and intensity and prosody of the vocalizations. All subjects rated “no” as negatively valenced compared to matched control words ($t=4.0$, $p<0.001$) and these ratings correlated inversely ($r= -.87$, $p<.001$) with BOLD response to the word “no” in the left inferior frontal gyrus (BA 47, $t=6.86$, $p<.005$, corrected). A comparison between the groups revealed that APs ($n=8$) had *decreased* bilateral anterior cingulate response (left, BA 24, $t=3.7$; right, BA 32, $t=3.66$, $p<.005$, uncorrected) and *increased* bilateral amygdala response (right, $t=4.4$, left, $t=4.3$, $p<.001$ with small volume correction) to “no” and not to the matched control word as compared to NPs ($n=9$). Scores on the ANTconflict were positively associated with the left inferior frontal ($t=4.89$, $p<.005$, uncorrected) activation and MPQag scores correlated positively with left amygdala ($t=7.43$, $p<.005$, uncorrected) specifically in response to “no” and only in the APs. These preliminary results suggest that the word “no” is a negatively salient signal that is associated with prefrontal activation. However, aggression prone subjects respond to “no” with increased subcortical and decreased prefrontal possibly reflecting their decreased control.